IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re Patent application of	:	
Yeong-Kwan KIM et al.	:	Group Art Unit 1762
Serial No. 09/414,526	:	Examiner Michael B. Cleveland
Filed October 8, 1999	:	

METHOD FOR MANUFACTURING THIN FILM

#38
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3/12/03

REQUEST FOR RECONSIDERATION

Honorable Commissioner For Patents
Washington, D.C. 20231

Sir:

This is responsive to the Office Action dated November 8, 2002.

Claims 15-27 were rejected under 35 U.S.C. ¶103 as being unpatentable over Kim et al. in view of Marcus et al. '579 and Luryi, for the reasons stated at pages 2-4 of the Office Action. Applicants respectfully traverse this rejection and request reconsideration thereof.

The Examiner once again wrongly accuses Applicants of arguing the references individually, so, for the benefit of the Examiner, Applicants will this time attempt to present their position in the simplest terms possible.

Kim et al. is the primary reference relied on by the Examiner. Marcus et al. and Luryi are secondary references relied on by the Examiner. As explained

below, it is Applicants' position that the teachings of the secondary references would not motivate one of ordinary skill in the art to modify the teachings of the primary reference in the manner asserted by the Examiner.

The Examiner alleges that Kim et al. teach "cleaning to uniformly terminate the surface with atomic hydrogen". The Examiner's use of the word "uniformly" is curious, since it appears in the present claims but does not appear in the Kim et al. reference.

Also curious is the Examiner's failure to address the reasons given by Kim et al. for the cleaning of the wafer surface, and, perhaps more importantly, the manner in which Kim et al. clean the wafer surface.

Specifically, Kim et al. reads as follows:

> "Prior to the growth of the Al2O3films, the native oxide covered substrate, Si(100), was cleaned by the conventional wet chemical treatment and diluted HF etching in sequence for the removal of particles and native oxides, respectively. The surface of Si wafer prepared in this manner is known to be contamination-free and terminated with atomic hydrogen." (Emphasis added.)

In the Office Action, the Examiner states:

> "Applicant argues that the objective of Kim is to "remove native oxides in the pretreatment [of the substrate]". The Examiner disagrees. The objective of Kim is to deposit a

> film by ALE on a uniformly terminated surface. Marcus teaches the equivalence of uniform oxygen termination with uniform hydrogen termination."

Apparently, the phrase "for removal of particles and native oxides" in Kim et al. carries no weight with the Examiner. However, Applicants still contend that a plain reading of Kim et al. reveals that the purpose of the wet treatment and HF etching is "for removal of particles and native oxides", and the result of the wet treatment and HF etching is a wafer surface that is "contamination-free and terminated with atomic hydrogen."

The Examiner seems to contend that it would be obvious to terminate the surface of the wafer of Kim et al. with oxygen instead of hydrogen. However, the Examiner completely fails to explain how this would be done. The hydrogen termination is a byproduct of the cleaning process of Kim et al. As such, the only way to avoid hydrogen termination would be to eliminate or modify the cleaning process. Applicants fail to see any disclosure in any of the cited references, including Marcus '579, which would motivate one of ordinary skill in the art to eliminate or modify the cleaning process of Kim et al. so as to avoid hydrogen termination. The Examiner has not addressed this point.

Again, Applicants do not argue the references individually. Rather, Applicants position is that there is no teaching or suggestion in Marcus '579 or

Luryi, individually or in combination, which would motivate one of ordinary skill in the art to modify the process of Kim et al. in the fashion suggested by the Examiner.

The Examiner contends that Marcus '579 teaches the equivalence of hydrogen and oxygen termination. Even if this were true, why exactly would one of ordinary skill eliminate or alter the cleaning step of Kim et al. to avoid hydrogen termination in favor of oxygen termination? How exactly would the wafer surface be cleaned without resultant hydrogen termination? What advantage would be gained? The Examiner has failed to address these issues.

Also, any alleged equivalence between hydrogen and oxygen termination must taken in the context of the teachings of Marcus '579 as a whole. Marcus '579 is directed to a laser coating process, which is presented as an alternative to machine tool subtractive techniques. Attention is respectfully directed to the following passages of Marcus '579:

> "An alternative preferred embodiment of the present invention comprises a method and apparatus of nucleating and renucleating the gas-phase deposition of the desired phases that make up the solid freeform fabricated three-dimensional part. In particular, the alternative preferred embodiment allows for catalytic deposition of the patterned layers as a predefined target area. Target area is defined herein as the location in which energy beams transform

material from a gas phase and deposits those materials onto an evolving part." Col. 6, lines 40-49. (Emphasis added.)

Marcus '579 is directed to the use of an energy (laser) beam to selectively deposit material from its gas phase. Kim et al. is directed to atomic layer deposition (ALD) of Al2O3 films. (ALD is a technique in which deposition of each atomic layer of material is controlled by a pre-deposited layer of precursor, and in which precursors of various components of the film are introduced alternately.) One of ordinary skill would not be motivated to apply the laser coating technique of Marcus '579 to the ALD technique of Kim et al.

Also, the Examiner's reliance on Luryi is misplaced. That is, Luryi teaches that the surface of a porous substrate is intentionally oxidized in a cleaning process, prior to a later high temperature treatment which removes the oxide. However, Kim et al. aims to remove native oxides in the cleaning process thereof, and the teachings of Luryi would not motivate on skilled in the art to oxidize the wafer surface of Kim et al. (which already contains native oxides) in the fashion apparently suggested by the Examiner.

Again, as explained in Applicants' previous response, termination of the substrate surface with oxygen atoms at a temperature of 120°C to 370°C is conducted according to the present invention to decompose both the silicon and the CH3 radicals of the subsequently applied first reactant. The cited references,

taken individually or in combination, do not teach the features of the now-claimed invention.

For *at least* the reasons stated above, and for the reasons already of record, Applicants respectfully contend that Claims 15-27 would not have been obvious to one of ordinary skill in art in view of the teachings of the cited references, taken individually or in combination.

Conclusion

No other issues remaining, reconsideration and favorable action upon the Claims 15-27 now-pending in the application are requested.

Respectfully submitted,

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March 6, 2003

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